Feedback — XV. Anomaly Detection

Help

You submitted this quiz on **Sun 18 May 2014 11:31 PM IST**. You got a score of **4.00** out of **5.00**. You can attempt again in 10 minutes.

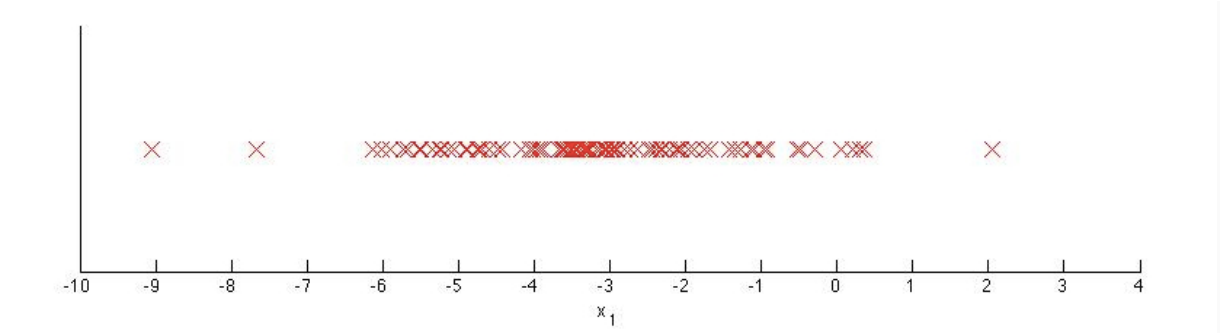
Question 1

For which of the following problems would anomaly detection be a suitable algorithm?

Your Answer		Score	Explanation
☑ In a computer chip fabrication plant, identify microchips that might be defective.	✔	0.25	The defective chips are the anomalies you are looking for by modeling the properties of non-defective chips.
☐ From a large set of hospital patient records, predict which patients have a particular disease (say, the flu).	✔	0.25	Anomaly detection would not be appropirate, as you want to train on both types of patient records rather than modeling one as "normal."
☑ Given a dataset of credit card transactions, identify unusual transactions to flag them as possibly fraudulent.	✔	0.25	By modeling "normal" credit card transactions, you can then use anomaly detection to flag the unusuals ones which might be fraudulent.
☐ Given an image of a face, determine whether or not it is the face of a particular famous individual.	✔	0.25	This problem is more suited to traditional supervised learning, as you want both famous and non-famous images in the training set.
Total		1.00 / 1.00	

Question 2

You have a 1-D dataset $\{x^{(1)}, \ldots, x^{(m)}\}$ and you want to detect outliers in the dataset. You first plot the dataset and it looks like this:



Suppose you fit the gaussian distribution parameters μ_1 and σ_1^2 to this dataset. Which of the following values for μ_1 and σ_1^2 might you get?

Your Answer		Score	Explanation
$\mu_1 = -6, \sigma_1^2 = 2$			
$\mu_1 = -6, \sigma_1^2 = 4$	✖	0.00	This is the correct value for σ_1^2, but μ_1 is the mean of the data, which lies around -3.
$\mu_1 = -3, \sigma_1^2 = 4$			
$\mu_1 = -3, \sigma_1^2 = 2$			
Total		0.00 / 1.00	

Question 3

Suppose you have trained an anomaly detection system for fraud detection, and your system that flags anomalies when $p(x)$ is less than ε, and you find on the cross-validation set that it mis-flagging far too many good transactions as fradulent. What should you do?

Your Answer		Score	Explanation
Decrease ε	✔	1.00	By decreasing ε, you will flag fewer anomalies, as desired.
Increase ε			
Total		1.00 / 1.00	

Question 4

Suppose you are developing an anomaly detection system to catch manufacturing defects in airplane engines. You model uses $p(x) = \prod_{j=1}^{n} p(x_j; \mu_j, \sigma_j^2)$. You have two features x_1 = vibration intensity, and x_2 = heat generated. Both x_1 and x_2 take on values between 0 and 1 (and are strictly greater than 0), and for most "normal" engines you expect that $x_1 \approx x_2$. One of the suspected anomalies is that a flawed engine may vibrate very intensely even without generating much heat (large x_1, small x_2), even though the particular values of x_1 and x_2 may not fall outside their typical ranges of values. What additional feature x_3 should you create to capture these types of anomalies:

Your Answer		Score	Explanation
$x_3 = x_1 + x_2$			
$x_3 = x_1^2 \times x_2$			
$x_3 = \frac{x_1}{x_2}$	✔	1.00	This is correct, as it will take on large values for anomalous examples and smaller values for normal examples.
$x_3 = \frac{1}{x_1}$			
Total		1.00 / 1.00	

Question 5

Which of the following are true? Check all that apply.

Your Answer		Score	Explanation
If you are developing an anomaly detection system, there is no way to make use of labeled data to improve your system.	✔	0.25	Labeled data are usefull in cross-validation and testing for evaluating the system and setting the parameter ϵ.
In a typical anomaly detection setting, we have a large number of anomalous examples, and a relatively small number of normal/non-anomalous examples.	✔	0.25	It is the reverse: we have many normal examples and few anomalous examples.

When developing an anomaly detection system, it is often useful to select an appropriate numerical performance metric to evaluate the effectiveness of the learning algorithm.	✔	0.25	You should have a good evaluation metric, so you can evaluate changes to the model such as new features.
In anomaly detection, we fit a model $p(x)$ to a set of negative ($y = 0$) examples, without using any positive examples we may have collected of previously observed anomalies.	✔	0.25	We want to model "normal" examples, so we only use negative examples in training.
Total		1.00 / 1.00	